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WE NEED TO CHANGE Ideas of Growth and Development in a Time of Crisis of Fossil Energy and Capitalism

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The purpose of this paper is to lay the groundwork, and provoke others to dig it up, for the holistic understanding of the economic hopes and geophysical drivers behind the themes of green economy and degrowth. It first fights for the voice in which to frame the warning of global civilizational collapse, its physical and historic drivers and experiential instantiations. The paper surveys the opinions of scholars from environmental science, biology, history, leftist social theory and economics addressing the notion that the global civilisation as we know it is facing a collapse of human societies and practices sustaining it[1]. Whilst there are historical narratives that evoke hope for a technological overcoming of this problem, in the text I endeavour to show how such a gamble is based on ontological confusion about the fundamental elements of the modern developmental success. The paper elucidates how the key collapse-mitigating model is not a matter of small life-style changes reliant on technological transcence of physical constraints, but a matter of serious social restructuring that would replace the missing technological fix. But for that to become democratically acceptable, the societies must renegotiate the indicators and definitions of what wellbeing consists in, whlist humanity must redefine what its endurance is to consist of, not hope for the miracle of green economy.

Key words: development, political economy, climate change, nature, civilisation, capitalism

> Of late years a determined attempt has been made to rewrite history in economic terms. But this does not go deep enough. Man's thought and social life are built on his economic life; but this, in its turn, rests on biological foundations. Climate and geology between them decide where the raw materials of human industry are to be found, where manufactures can be established; and climate decides where the main springs of human energy shall be released. Changes of climate cause migrations, and migrations bring about not only wars, but the fertilizing intermingling of ideas necessary for rapid advance of civilization.
>
> (Huxley 1953: 61)

> [Critical rationalism owes its inspiration] to the entire Enlightenment ambition to create a historically grounded human science which would one day lead to the creation of a universal civilisation capable of making all individuals independent, autonomous, freed from above and below, self-knowing, and dependent solely on each other for survival. [...] Much of what modern civilization has achieved we obviously owe to many factors, from increased medical knowledge to information technologies to vastly improved methods of transport, which although they are indirect legacy of the Enlightenment, and the revolutions in science and technology which both preceded and followed it, have no immediate or direct connection to its ideals. But our ability even to frame our understanding of the world in terms of something larger than our own small patch of ground, our own culture, family, or religion clearly does.
>
> (Pagden 2013: 315, 350-351)

[1] About Group 22 see more at: http://www.grupa22.hr/pocetna/about-us/.

Introduction

Finding a voice in a text of this kind is a problem not only of academic abstraction but also a diagrammatic illustration of the nature obstacles before analysis and strategies addressing global civilizational collapse under transgression of limits to growth. Whilst the exploration and connecting of the topics is often solitary, as there is no established discipline in which to couch most of the discursive word-games and find a community, the analysis of causes and exploration of mitigation and adaptation strategies necessarily concerns a 'we' of 'developed' societies or even the entire human population. And then within the grand 'we' there are necessarily divisions into those who debate, those who pollute, those who benefit, those who suffer, those who will suffer, and those who read this etc. Now add a layer of shifting timescales to all that, from timescales of geological forces to timescales of individual lives against which analyses and strategies are made meaningful.

In explaining the reasons why this might be a special time for the whole human population alive and the cultural edifice it accumulated, the narrative must draw on large scales of geological and biological evolution, development history, but also on the everyday scale of the political and economic struggles within lives of the author and the readers (you and I). If you think that nothing meaningful can be said about 'tea' as a drink I had this morning and the important commodity in pre-industrial trade within the same text, then read no more. For this is a text with exactly that task, to show how both the individual experience and the grand historical narratives weave an important meaningful whole to understand something about our common future (again, mine and yours). This lengthy introduction serves to warn of the limitations of language, traditionally disciplinarily partitioned, especially in academia, to address a real and present danger. It relies on an optimistic hope of linguistic adaptability in achieving understanding between humans, whilst dismissing simplistic hopes of 'greening' of economic growth and 'technological fix' of the physical constraints of the capitalist growth model. If you are still reading this, then you understand what I have said thus far; and so on…

In that vein the rest of the text will present the warnings of the combined social and natural drivers of the collapse of the production of benefits through the medium of civilisation (a common good of humanity as a whole), overview of the structures within the development process complementary to civilisation, and unsubstantiated promises of technological leap of the physical constraints and of inconsequential unlimited growth. It is only this vainly ambitious because the trans-disciplinary review convinces me that the extent and 'wickedness' of the problem requires ambitious solution attempts over and above tried and tested instruments of different academic and technological disciplines parcelling individual and collective experiences into manageable reductions. And, without further questioning, I write this from the position that civilisation is worth preserving. From that I try to show (a) that a new organization of knowledge able to interpret the complexity of different scale of collapse drivers is needed, (b) that a global subject ('we') of those interpretations has to be defined, and (c) that the concept of collapse has to be given serious thought as a consequence, a possibility and a future to be avoided at every possible juncture.

Development, Progress, History and Hopes of Fellow Humans

'We live in extraordinary times', is a long lasting saying usually employed to convey concerns regarding social change, big and dramatic events or challenges to everyday existence. But this

time it really, really means exactly what it says, despite sounding like crying 'Wolf!' when finally the whole (global) village is no longer listening. First of all, 'We' is humans alive today, all seven billion of us, and this is by far the most humans simultaneously eking a living out of Earth's resources than at any time in history. But, 'we' is, more importantly, a smaller group of citizens of only 47, out of just under 200, countries with very high human development index (HDI) value (UNDP 2013). The lowercase 'we' comprises less than one fifth of humans alive today whose countries account for about a half of annual greenhouse gas pollution and economic activity, whilst commanding most of military and political power (UNDP 2013).

A survey of other inequalities on the planet, between and within individual countries, would present even more startling ratios of wealth, nutrition, protection from weather conditions and the like. Most of these are well known memes repeated through internet and other media, epitomised in artwork[2] etc. What is interesting for our purposes is that from a historical perspective, as the command of materials and energy conversions has risen dramatically for the species as a whole, so have inequalities in access and control over them within the human species. Yet, we still see ourselves as part of the same potential, if not practical, community. This is not just an ideological smokescreen, almost all humans alive today do not just share the genetic makeup from a biological perspective, but are a part of the language community in a way Wittgenstein (1967) defined a family of language games we can all play with each other. However much some might feel kinship with their pets, there are communal enterprises each human being can undertake with another willing human being that one cannot with members of other species. But most people do not need to be told this obvious fact anyway; it is a part of majority's notional moral code. It is worth repeating here lest someone concludes from a special historical position that an evolutionary point has been reached where those who have are somehow fundamentally different and alienated from those who have not. They aren't, and they still live on the same planet with the same scarce resources. They just, for some historical and cultural reasons take a much, much larger share of those resources than ever before.

So first and foremost, times are really extraordinary given the number of people on the planet. But as that number has been growing exponentially over the last few centuries, famines, epidemics, wars and geophysical cataclysms notwithstanding, it must have been extraordinary, only a little less so, for at least a 150 years now. Something else must be making it really, really so. That is the second special condition. Paul Crutzen coined the name "Anthropocene"[3] for the new geological era that humans have brought about in the life of the planet (cf. Zalasiewicz, Crutzen, and Steffen 2012 for overview). The name "Anthropocene" suggests that we are living in a special time in which our species, our societies and cultures, act with the power of a geophysical force (Archer 2010; Sager 2011). Geophysical forces usually involve physical process through which tectonic plates are shifted; major volcanic eruptions change the concentration of different compounds in air, sea and soil; or a large extra-terrestrial object (an asteroid) strikes the surface of the planet. Well, that should be extraordinary enough, but life overall, and some species or ecosystems in particular, have played a crucial role in shaping of the bio-physical conditions on the planet before; such as increase in the proportion of the highly corrosive oxygen in the atmosphere has been (Catling 2005). We consider these to have been unintended consequences of unreflexive agents though, drawn out over much greater time-spans.

[2] Mladen Stilinović, *Nobody wants to see.* ("3 richest men in the world own as much as six hundred million of the poorest people"); http://universes-in universe.org/eng/bien/istanbul_biennial/2009/tour/antrepo/mladen_stilinovic.

[3] A number of other different names have been suggested for the new age that humans have ushered in: including the *Catastrophozoic era, Homogenocene, Myxocene* (from the Greek word for "slime").

Going back to Wittgensteinian language games, 'we' tend to consider our reflexive species to be at least partially collectively aware of the contemporary potential to perturb the everyday reality. And the most obvious such perturbation is the collapse of a complex interaction between the biophysical environment and humanity that underpins the everyday edifice of civilisation. Though almost every civilisation in recorded history has undergone a collapse at some point, often materially caused by overexploitation of the environment (Diamond 2005; Morris 2011; Montgomery 2012), these were local and regional phenomena in the past. In today's highly interconnected technological society, the threat of civilizational collapse is global – both in terms of consequences and in terms of causes (Ehrlich and Ehrlich 2012). The globalized character of contemporary society is itself a historically special situation (Burke III 2009), so that almost no human groups today can consider themselves truly independent from civilisation however much they may protest their unwillingness to be its part. The globally dispersed humanity is interconnected in a web of civilisation where local shake-ups have global consequences (Goldin 2013). However, there is more to our predicament today than the mere domino effect of high economic and cultural interconnectedness. The global 'We' that effectively, if not politically, constitutes the civilisation is overall changing the material conditions on the planet with the power of a geophysical force whilst internally composed of structure characterised by vast inequalities of physical impact and political power.

One of the joys of reflexivity provided by language is the possibility to model and examine the counterfactual (past, future, invisible or abstract) situations and evaluate their desirability from the present experience. Whilst a model is never the perfect replacement for the real experience, it is precisely what should, from the evolutionary perspective, differentiate humans from over-reproducing gas-exhaling bacteria. Such simplifying models aided by mathematical rationalisation and computing power have for a few decades been warning of the consequences of overshoot of civilization's consumption over what the biophysical manifold on the planet can regenerate from the solar input. What is interesting in the more recent modelling (Motesharrei, Rivas and Kalnay 2014) is that a combination of resource depletion and excessive inequality radically speeds up the total collapse of civilisation compared to letting each of those collapse-drivers act alone. What is more it seems that the socio-technological structure, in which resource depletion is mediated through the poor but benefits and is governed by the extraordinarily rich, acts as a veil hiding the warnings of rapid collapse from those best positioned to act on them. Through a toxic mix of excessive resource depletion and excessive inequality we lose our reflexive potential as a species, making us more akin to the oxygenating bacteria of a geologically very distant past. This is why we must cry 'Wolf!' for real this time, and truly accept that we live in really, really extraordinary times.

'Desparate, but not Serious' – An Academic Exposition

In everyday language away from abstract mathematical modelling of humanity-nature interactions we need to talk about material and labour-related benefits that contemporary civilisation provides for most of the populations in the developed North and West. That is houses, cars, and computers through which texts like this are exchanged, and the literacy dedicated time to exchange them. The availability of abundant cheap energy derived from fossil fuels has freed modern societies from massive physical labour in the sustenance of civilisation,

enabled us to live more productive lives and reduced proportional levels of physical violence detrimental to individual wellbeing (Wills 2013). At the same time, it has overwhelmingly contributed to a global irreversible change in climates, ushering a potential collapse of contemporary human civilisations around the globe (Ehrlich and Ehrlich 2013). Notwithstanding this fundamental energy-culture paradox, 'developed' human societies also remain welded to the idea that their overall wellbeing lies in the ability to increase the global output of goods and services by at least 5% per year, despite clear signs that continuing down this path is destructive (Graeber 2011). So the important question of 21st century development becomes why populations of political units (states, more or less loose federations and the like) must be promised an increase in goods and services year on year for a hope of wellbeing.

The most plausible retort is that as presently not all members, with equal potentials and notionally equal rights have equal access to the benefits extracted from resources and energy, and converted into goods and services. The benefits are now scarce, and as they increase overall there will supposedly be more for everyone. But social structures distributing those benefits are such that they further exacerbate rather than reduce the inequality globally, only exacerbating the feeling of have-nots that more has to be created so that they could share in the spoils. It is important to note that the last sentence, from a global perspective, refers not so much to those without food, shelter and medication, but those without a whole other range of consumables. The debt-driven path of ever expanding production of consumables would in itself be problematic (Graeber 2011), but it is now coupled with the approaching tipping points of irreversible climate change. A more academic response would also point out that the structure of financing production in capitalism through borrowing with interest, whilst at the same time producing goods in constant competition with other producers, of necessity forces the rise in GDP and resource consumption simply to finance the original interest incurring debt. Is it possible to design sufficiently large and therefore sustainable societies not deriving their wellbeing from regular increase of production of goods and services?

Meta-assessments of research in physical and social sciences, such as those issued by the IPCC working groups (http://www.ipcc.ch/report/ar5/index.shtml), warn that beyond 4°C of near-surface warming above the pre-industrial average temperature (which is where the current development model is heading), lie severe irreversible material changes for which we have no adaptation capacity. In other words, without mitigation of causes of global climate change, our civilisation will probably not be able to adapt to the ensuing climatic and biophysical changes. Given the scientific and cultural development over the last few millennia, we may say that the way the world works today leads to there being no 'world' in some near future. This is not to say that there will be no humans, but the civilisation that humans have been developing over the past few millennia, and through which we interpret our wellbeing and environment, will wither away with sudden disappearance of its biophysical foundation (crops, resources and weather patterns). Not only is its physical resource base depleting at a scale that is unmatched by innovative resource replacements, but the ecosystems that the human population depends on for nutrient circulation are collapsing as well.

A good illustration of adaptation capacities and collapse outcomes is provided by the seas, the primary habitat on the planet that we only peripherally inhabit (and thus are less aware of), but readily exploit for nutrition and biological resources. Many regions have in the last decades been devoid of fish stocks, but swamped by ancient and effective, often stinging and unpalatable jellyfish. Whilst our own population growth and technological prowess drive us to overextract the fisheries capital, ancient and resilient organisms such as the unpalatable *medusa* (a stage in life of the jellyfish) thrive and create eutrophic dead zones

eventually inhospitable to human utilisation. There are organisms, like the jellyfish, that are perfectly capable of thriving in zones where ecosystems that humans have co-evolved with wobble and fall, but there is no room for humans, such as we are today, in those fallen zones.

These organisms, though, can also teach us a lesson through their ability to 'degrow' even individual bodies when their own ecosystem support is scarce (Gershwin 2013). In that manner they sustain self-inflicted growth reductions, but essentially endure unchanged as a species. The jellyfish illustrate how life in general can prevail through sudden disturbances of slowly evolved ecosystems (as jellyfish are also *alive*), but also how inhospitable to human flourishing these impoverished ecosystems can be. Not only do the medusa sting, but jellyfish on the whole drown out other life forms and clog up technological equipment used in seawater. They are highly resilient to human deterrents and most of the time act like another blind geophysical force, they simply drift on the currents.

Putting it simply, humanity can pursue business-as-usual hoping for the best whilst researchers in some disciplines know we are heading for a fall, or make a deep-rooted switch to sustainability using our collective knowledge in an attempt to restore and maintain a 'green equilibrium' (Wills 2013) that we depend on for individual wellbeing as much as we do on air or social cooperation (Wilson 2012). A lesson from this biological concept is that stable, vibrant, abundant, diverse and resilient ecosystems result from a wide variety of environmental pressures and biological components: conversion of Sun's energy into biological structures, predators and prey, parasites, geophysical events. None of the 'green equilibria' are permanent. As the pressures affecting relative frequencies of species' populations within an ecosystem change so do the ecological structures and genetic equilibria within it.

But many of the species within an ecosystem that have had the evolutionary time to reach an equilibrium role most often have a high ecological diversity and very high within-species genetic diversity. As a species and a piece of the 'green equilibrium' puzzle they have a stock of fall-back options in times of change. In biological terms, as the physical environment changes its biological species can draw on the said diversities to increase the chance that some member of the ecosystem will survive through the change. Diversity engenders the overall resilience of the system. But human Anthropocene forces have pushed many of the slowly evolved 'green equilibria' suddenly and far out of balance, whilst reducing diversity of the ecosystems we draw resources from. Beyond a certain point, they cannot recover the overall system stability out of their own stock of fall-back options, as they have not evolved to face the specific pressures of the very recent Anthropocene.

As researchers, educators and innovators (social or technological) we must be broadly aware of our species' straddling of processes of vastly different scales ordinarily relegated to separate disciplines of discourse: the dynamics of inanimate Earth system, history of life and human evolution, the history of globalised industrial civilisation, and the collective intellectual creativity of humans freed from muscular toil for everyday sustenance (McNeill and McNeill 2003). The task is to find a voice that speaks from this straddling perspective. Once the references are surveyed and texts have been written and read, human beings as a species of 7 billion equivalent individuals no longer have an option of backslide to the 'state of nature' where happy and ignorant bliss prevailed. Historic state of 7 billion of us on limited planet other than a painful collapse, is a civilisation – inevitably plural, dynamic and complex (Pagden 2013). Civilisation then and now involves some form of coordination and subjugation. It is a combination of awareness of physical and social limits of development with technological and political instruments to guide development within those limits. An obvious enough point, but what is the acceptable such form that reduces insecurity and promotes emancipation?

History of Development Components: Shortcomings of the Technological Fix

As literate humans we have been taught to pride ourselves in belonging to a species that not only produced a civilisation, but managed to do so through increasingly efficient use of natural resources thanks to the ingenuity of the technological invention. Such a narrative ignores other necessary components of the civilisation construction which coevolve with technology, and is the basis for the vain hope that the present predicament will also be altered through technological ingenuity – an efficient and clean source of energy.

Most of what produced our current civilisation resulted from the 'developmentalist project': state-building, sedentarization and intensification of the exploitation of available resources (Pomeranz 2009); a manifold on which the benefits of civilisation are constructed. It enabled increases in average life expectancy and general physical health, as well as rise in population, although not automatically an even distribution of these benefits. The comprehensive historical narratives suggest that basic ontological categories of the developmentalist project are (1) technological mechanisms of energy conversions, (2) social structures that utilise the said energy and maintain the technological mechanisms, and (3) the governance mechanisms that supervise and maintain the social structure energy utilisation.

These structures describe the time-protracted processes of the developmentalist project enactment, not the actual societies and civilisations embodying the contemporary outcome of the project at any given time. But again, this *Meccano*-style modelling is important here only to indicate that the potential for overall global equlibirum-restoration is not just through the modification in one of the components 1-3, as the present predicament has evolved through contingent changes in each of the components. With rise in population and material well-being, energy available for conversion for human needs was always everywhere eventually capped, resource limits have been reached. Within very recent history, which is the most relevant developmentalist lesson for contemporary societies, gambles on technological change (component 1), and imperatives of growth and centralised state-power (component 1 and 3) have dominated in order to make the unpalatable deep social structural change (component 2) unnecessary even in the nominally socialist societies (Weiner 2009).

Long-term ecosystem stability and human populations were already at odds in dominant civilisations of East and West in early modern period, through shortage of biomass as energy and construction resource, and a depletion of fertility of the soils (Pomeranz 2000). It is often simplistically assumed that the steam engine was a miraculous breakthrough that enabled early modern European (Western) societies to escape this ecological bind of population-energy-food imbalance through intellectual ingenuity. Industrious humans applied Reason to uncover the secrets deliberately concealed in physical processes and that way they extracted more benefits from a seemingly depleted physical foundation. However, more elaborate analyses (for example De Vries 1993; Pomeranz 2000; Arrighi et al. 2003) reveal that Western developmentalist project was sustained, and headed for the present perilous predicament, along a decidedly contingent path of territorial expansion and more or less deliberate transformations in social structures and governance mechanisms alongside and even before technological breakthroughs. The East Asian path, eventually outcompeted by or incorporated into the aforementioned Western one, was no less efficient in energy conversion (1) or its rebalancing within the overall population-food constraints. A different combination of society (2), technology (1) and governance (3) was applied in the dominant early modern

civilisations of the East, resulting in different resolution of ecosystem-population imbalance until the globalising spread of the fossil fuelled Western form of developmentalism.

Since the Industrial age in the West the developmental paradigm relied on the expansion of the capitalist mode of production, providing most of the material underpinning of what humans today call civilisation. Even 20th century experiments with alternative forms of economic organisation through state socialism, also unwaveringly pursued economic growth and technological intensification of energy conversion as drivers of hope for wellbeing (Weiner 2009). So today there are hopes for a technological fix along the lines of the aforementioned simplistic assumption of the revolution in energy conversion mechanisms (1) brought about by the technological utilisation of coal as a fossil fuel. But there is no historical evidence of successful state-wide reduction of climate-change-inducing greenhouse gas emissions except in the historical collapse of industrial society in the Russian Federation since 1990s. That was certainly not a technological breakthrough, but a technological regress accompanied by drastic changes in social structures (Hoffman 2011).

Historically also we have witnessed a large rebound effect where the resource efficiency gains have been made ('the energy is now pollution free so we can use that much more of it') and very small next to no reduction of environmental impact per unit of output along the whole energy conversion technology supply chain. A particular technological mechanism may, once it is installed, produce 'clean energy', but may not have been sufficiently clean in coming to that stage to warrant hopes for a technological revolution that on its own removes the climate change constraint. A novel energy conversion mechanism, free from the climate-change constraint, will not necessarily supply energy to the society in the form the current fossil fuels do. The distribution of energy through the social structures in the developmentalist process will change with it, as is the case with existing renewable solar and wind electricity sources which are weather- and geography- dependent and not transportable in the same way that fossil fuels have become.

Finally, supposing that the novel energy conversion mechanism was found, it would have to be distributed through the large and growing human population very quickly in order to have the desired global effect on climate change (Hoffman 2011). It is a challenge to answer whether such a distribution would be possible without significant modifications to the existing governance mechanisms and social structures of energy distribution. Though technologically more developed and politically more interconnected than ever before, can we bring the carbon intensity of the global human population to less than pre-industrial levels, whilst maintaining the population size at 10 times pre-industrial level, with only the change of the dominant technological mechanisms of energy conversion, and within half of a human individual's lifetime (30-40 years)?

> [Technologies] developed to resolve one problem often end up creating myriad new, often unanticipated, problems. [… All of the proposed] types of technology-focused "fixes" are highly controversial, risky and bring with them the potential for serious environmental harm. An overemphasis on technology also tends to displace solutions to problems that are simple, yet effective, and reinforces the belief that [other structural changes] are not necessary in order to reduce humanity's impact on the planet. (Tienhaara 2009: 18)

Whilst energy is available in the physical environment of planet Earth, and needs to be converted to useful forms and transported through technological ingenuity, it is futile to hope that a sufficiently widespread and efficient mechanism will be 'discovered' in the time it takes to avoid a collapse. Perseverance of civilisations – plural, dynamic and complex – will require

timely and ingenuous adjustments to social structures and governance mechanisms to make up for the shortfall from energy conversion mechanisms employed for their sustainability potential. What exactly might these look like on the ground? Let's start planning from knowing how drastically fossil fuel energy conversions must be limited, a global cap on GHG emissions.

Capitalism as the Evolving Social Structure?

Early modern ecosystem-populations imbalance in the East was addressed by the labour-intensive development project not focused on territorial expansion aided by technological transcendence of energy conversion constrictions (Wood 2002; Pomeranz 2000), as in the 'industrious' development of the East (Sugihara 2003). Whilst historians struggle to explain the contingencies that lead to divergence of development paths between East and West since early modern times, for our purposes here it is important to note that "these are not due to the fact that the progressive West discovered capitalism and the modern state and China did not" (Rowe 1990: 262). There are also examples of environmental resources governed through *commons* that meet the economic needs of the human population without being overexploited, or resulting in disproportional accumulation between the 'commoners'. Whilst these alternatives are not profit-maximising and are often purposefully localised rather than globalised, they combine material benefits with environmental sustainability and can thus begin to make sense in 'Western' terms too (Pomeranz 2009). One should expect that technological (1), social (2), but also governance (3) innovation can expand the scale of past communing practices. Could reliance on the extensive knowledge of natural and social historical processes help make the formerly localised alternatives benefit the global population?

Capitalism, as a contingent outcome of specific historical conditions, rests on the imperative of constant self-expansion rooted in wholesale transformation of the metabolic exchange with the rest of the biosphere and distribution of life's basic necessities within human societies (Wood 2002). Its growth imperative coupled well with the localised transcendence of the bio-physical limits through fossil-fuel innovation in technological mechanisms of energy conversion (Rundgren 2013). In other words, the steam engine and territorial expansion for essential resources reinforced each other. But the dubiously 'winning' formula was provided by the absence of governance (3) "hostility to any individual making himself "abnormally" rich" (Braudel 1982: 589). It is also characterised by regular stagnation and downturns, with associated reductions in environmental impact and increase in human existential misery – although this relationship has not always been linear due at least in part to 'extra-economic' interventions of the kind that societal and governance changes could impose in the current situation too (Wood 2002: 93). Now that the expansion cannot continue in territorial and material sense, a miraculous technological breakthrough in energy conversion is not provided whilst a lot of the collapse-inducing technology is locked in, democratization and strategic degrowth of economies, and changes in income-distribution remain the only avenue open in developmentalist project we base civilisation on.

Apart from the creative-destructive effects of capitalism on social structures, widespread dispossession, intense exploitation, and immoral disregard for human life in the interest of profit, it was the productivity-for-profit rather than the structural novelty of technological mechanisms that was initially manifested in the irresponsible land use and reduction of biosphere's regenerative capacity (Wood 2002). Productivity-for-profit rather than widespread

benefit distribution set the modern unsustainable train in motion, the imperative of growth cloaked as promise of emancipation. That in itself was a forceful, not simply evolutionary, change of social structures, which had to be imposed from above by those members of the society who benefited most from it (Hobsbawm 1952). Rather than simply occurring once the steam engine and financial capital became available, it had to be actively fought for by members of society who recognised their most immediate interest in it. And those were not simply citizens hungry for more variety in cotton cloth and earthenware, but more nefarious individuals (Rundgren 2013). It is still resisted when forced upon people in non-Western 'underdeveloped' societies. Even the 'developed' democratic populations aim to resist technologically risky economic growth policies, whilst over a certain threshold increase in wages will not compel those populations to work more (Barry 2012). Globally speaking capitalist growth imperative is a harmful mechanism fed off increasing inequalities hiding behind a promise of increase in education, health, communication and food production for people who need it most.

Far from arguing for the return to pre-modern agrarian social structures, which were themselves also an outcome of developmentalist project and not a benevolent 'state of nature', let's propose that the current threat of collapse can be addressed by purposeful re-organisation of (2) social structures and (3) governance mechanisms. These two components of civilisation should be aimed at maintaining its benefits in combination with the multifaceted transformations of the energy conversion technology that are existing, simple and effective (Tienhaara 2009). Whilst it is made meaningful in communities and within political units, this is a change to be enacted globally. This wholesome requirement comes from the global nature of climate change, the global mechanisms that enforce the 'resource depletion + inequalities' collapse of civilisation described above (Motesharrei, Rivas and Kalnay 2014) and the fact that developmentalist project globally is tied in a single global capitalist fossil fuel sustained society now (Arrighi et al. 2003).

Perhaps the most important lesson of historical appraisal of capitalism as a contingent outcome of the developmentalist project (Wood 2002; Pomeranz 2000; Sugihara 2003) is that once capitalism's mechanisms for social reproduction and development have been established at one locale it inevitably transforms all others. Its inherent logic of expansion eventually forces other human societies with which it is in interaction to resort to exploitation of humans and environment, which is another strong argument for why we must understand the current crisis as global in character. Apart from that, it also suggests that the transformation of social structure and governance mechanisms should be more substantive than the softening of the profit ethic through 'social market' or 'market socialism' (Wood 2002: 195). The growth imperative spreads faster even than ideologies employed in its justification, and the hope for a 'green growth' brings much false hope and excuses for inaction in the crunch of extraordinary times (Hoffman 2011).

What Kind of Transformation is Needed to Avoid the Collapse?

While there is no universal and widely accessible energy source or technological efficiency breakthrough available to maintain current population and profit growth within climate and ecosystem equilibrium limits (Li 2008; Ehrlich and Ehrlich 2103), there is already a host of smaller scale technological mechanisms fit for a more sustainable energy extraction. While not implying a return to the pre-modern age, these strategies involve transformations in so-

cial structure, governance mechanisms and a thorough re-evaluation of components that make up our understanding of human wellbeing. Democratization of economic practices, changes in social distribution of incomes as tokens of access to energy conversions, and a culture decoupling civilizational attainment from consumption behaviour are the transformative directions for the developmentalism of the 21st century.

Standing at the end of a long line of analyses of what is unsustainable about our present existence and wherefrom these characteristics historically arose, this text and its role in the journal cannot be but a rallying call to intellectual mobilisation concerning the projected and as yet untrodden future. Historical analyses coupled with abstract modelling of interaction of basic ontological categories in society-ecosystems-resources nexus allow for projections in which collapse could be indefinitely avoided and human population brought into stable equilibrium with the rest of the global ecosystem if the per capita rate of resource extraction for energy conversion remains at the naturally renewable level, and if the benefits of this extraction are distributed in a reasonably equitable fashion (Motesharrei, Rivas and Kalnay 2014). On the other hand they also suggest that over-extraction and rise in inequalities most likely lead to a relatively swift collapse (Meadows, Meadows and Randers 1972; Motesharrei, Rivas, and Kalnay 2014), which is initially invisible to the top echelons shielded by their wealth until the ecosystem collapse brings about a visible collapse of the primary producers (Motesharrei, Rivas, and Kalnay 2014). By which point it is too late to change the course.

Whilst a collapse of the current global civilisation would stop the developmentalist project in its tracks, along with its ecologically detrimental but also humanly emancipatory outcome, humans' intellectual straddling of processes of vastly different scales allows us to design a sustainable degrowth project (Kallis 2011). The developmentalist project has hitherto not operated in the state of equilibrium, but there is nothing *in principle* preventing it from attainting that state, just as new species eventually reach a novel state of 'green equilibrium' with resilient ecosystems. This is a historic turn in the developmentalist path, a political project of transformation of global governance mechanism and a re-evaluating of individual wellbeing. It is a vision of a civilised society with leaner and stable overall energy conversion output, where wellbeing is structured through equality, interpersonal relations and simplicity. As weavers of narratives academics and researchers must bring to human understanding the processes unfolding on non-human scales, and this time round try to do it in emancipatory fashion in order to degrow but not destroy the civilizational accomplishments (technological and social) to date.

There are three important points to take home from this. Firstly it is important to train oneself to adopt a perspective where one can accept the possibility of the flow of history being dramatically upset (a collapse). The second is to realise that the path to this state has been a matter of contingent historical choices, however minute individuals' impact on them has been or is today. And finally, it is important to realise that material constraints of climate change and resource depletion, and social constraints of inequality inherent in the ideal of unlimited economic growth are "two sides of the same coin" (Beck 2010: 257). If we were to put ourselves seriously into the standpoint of a future collapse as if it were already experienced, knowing the contingencies of history and a necessary interaction of technological and social components of developmentalism's contribution to civilisation-building, we could consciously entertain *the past* counterfactual possibilities with an affective urgency. "If we had done this and that, the catastrophe we are in now would not have occurred!" (Žižek 2008: 461). From such a vision comes the real strength to break the bonds of individual insignificance: get up and act today for the collapse not to occur. Welcome to the thinking for the 22nd century!

COMMENTS

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Attacking a Wicked Problem: Advancing Alternative Conceptions of Wellbeing En Route to Sustainable Degrowth

When Rittel and Webber first defined a "wicked problem" (1973), they did not have in mind our current struggle to find socially sustainable responses to global environmental challenges. They were developing a general argument about the limits of policy responses to important social issues and they wanted to draw attention to the fact that the classical science paradigm which lies at the foundation of modern conceptions of development is not applicable to societal problems. While problems in the natural sciences are "definable and separable and may have solutions that are findable", key social challenges of today are none of these things. Probably the crucial distinction among them is in that social problems do not have solutions; at best they get re-solved again and again given that they rely on outcomes of political struggles (ibid.).

This concept of a wicked problem was recently applied to climate change (Levin et al. 2012), ascribing it with four key features: time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address them is weak or non-existent, and irrational discounting occurs that pushes responses into the future. These features lead to the latest version of the good old *tragedy of the commons*: governments fail to respond even though it is well recognized that actions must take place soon to avoid catastrophic future impacts. The latest IPCC reports (2014) clearly state that without rapid and serious mitigation efforts human societies will not be able to adapt to the ensuing climatic and biophysical challenges.

Characterising climate change as a wicked problem is one of the entry points Domazet uses to focus our attention on the urgency of the task at hand, given that we agree with him that human civilisation as it stands today is worth preserving. I too start from that assumption, even though I acknowledge that, paradoxically, while we consider reflexivity as our distinctive feature in relation to Earth's other species, our impact on the planet has become akin to geophysical forces such as the shifting of tectonic plates or volcanic eruptions (Archer 2010). Since our physical impact on the planet has reached a point where we cannot continue our territorial and material expansion, we should abandon the naive hope in a technological fix. Instead we should recognise that the wickedness of this problem requires going far beyond technocratic tinkering parcellised into traditional academic disciplines and towards embracing a deeply ambitious political project of making a deep-rooted switch to sustainability (Wills 2013).

In other words, it requires recognising that the switch to sustainability is a profoundly social challenge, involving primarily changes to social practices, institutions and governance mechanisms by applying principles of democratisation, egalitarian redistribution and de-

growth. Our task as "weavers of narratives" (cf. Domazet) is therefore absurdly ambitious – it consists of nothing short of re-imagining the developmentalist project so that it aligns human wellbeing with practices that ensure our material sustainability on the planet. Faced with such a Gargantuan task, the only way forward I can see is in dancing the double-step of big thinking while making small practical proposals. Levin et al. (2012) propose that we design policies which will "constrain our future collective selves", by which they mean intervening into our social and political practices in ways which are sticky in that they will become entrenched, expanding support over time. How do we start?

The elephant in the room which connects our physical impact on the planet with social constraints of inequality is capitalism, which is inextricably wedded to the principle of infinite economic growth (Wood 2002). Given that the growth imperative is a structural feature of capitalism in all its varieties (Harvey 2007), there is basically no way of reconciling the capitalist mode of production with a genuine switch to sustainable degrowth (Kallis 2011). Therefore, what lies ahead is a series of deep changes in our basic institutons governing land, labour and money, towards an economic system that will no longer be identifiable as capitalism (ibid.). However, given the current constellation of power, winning popular support for a transition of that magnitude is unlikely to say the least. Instead, we look for cracks in the system where we can insert policy proposals with potentially transformative effects. One such policy proposal is in decoupling concepts of wellbeing from consumption behaviour, primarily through replacing GDP as a measure of progress with alternative indicators of welfare.

Over time we have accepted GDP as a measure of welfare, though it was never designed to measure more than pure market economic activity (Kubiszewski et al. 2013). Not only that, GDP interprets every expense as positive and fails to distinguish welfare-enhancing from welfare-reducing activities (Talberth et al. 2007), so that an oil spill increases GDP because of associated costs of cleanup, while growing vegetables and cooking home meals does not get included in a country's GDP. In addition to that, GDP says nothing about within-society distribution of income, though this is one of the primary determinants of individual wellbeing (Wilkinson and Pickett 2009).

Ever since the Stiglitz-Sen-Fitoussi (2009) report, momentum has been growing around the design of alternative indicators of wellbeing and progress which would better integrate economic with environmental and social dimensions (Costanza et al. 2004). In recent years we have witnessed the development of a host of alternative measures that aim to capture aspects of human wellbeing, security and quality of life, such as the Happy Planet Index,[4] the Genuine Progress Indicator[5] or OECD's Better Life Initiative.[6] Closer to home, Group 22 has published analyses[7] which shed light on Croatia's development trajectory and future perspectives by using UN's Human Development Index, the Ecological Footprint index, as well as a host of indicators capturing levels of income inequality (GINI, risk-of poverty, material deprivation etc.). We have shown that societies on the European semi-periphery are poorer, which should according to theoretical expectations (Franzen and Mayer 2010) predispose them to be less likely to act towards environmental prerequisites for a sustainability switch (Domazet, Dolenec and Ančić 2012). However, despite a lower commitment to individual material sacrifice, concerns on behalf of the environment and global empathy in these societies is higher than might be infered from their level of development, as measured by GDP. It

[4] Information available at http://www.happyplanetindex.org/.

[5] Information available at: http://genuineprogress.net/.

[6] OECD Better Life Initiative http://www.oecd.org/statistics/betterlifeinitiativemeasuringwell-beingandprogress.htm.

[7] See for instance *We need to Change* (2012), as well as several texts in the recently published *Sustainability Perspectives from the European Semi-periphery* (2014).

is worth also adding that these are societies with a significantly lower environmental impact, globally and often even locally; societies which carry a comparatively lower historical imperative to initiate the global sustainability switch.

A crucial obstacle to wider action is in fact inequality, given that the benefits of economic growth and development over the last 20 years have not been equitably distributed. Decreasing inequality therefore becomes a priority, since this is a precondition for developing social relations of trust and cooperation. We cannot expect collective action when material conditions of life and resulting life chances are so disparate as to separate citizens into different socio-material realities (Sandel 2012). Without a basic sense of shared humanity we cannot engage in a democratic debate on the features of a just and sustainable society (Wright 2011).

Though the introduction of alternative measures of wellbeing does not take us as far as we need to go, hopefully it represents a step in the right direction by carrying transformative potential. Fraser (2000, 2003) distinguishes between affirmative and transformative strategies with respect to how they relate to underlying social structures and outcomes they generate. Affirmative strategies aim to correct inequitable outcomes without disturbing the underlying social structures while transformative strategies aim directly at the underlying generative framework, which clearly makes them more desirable. However, they are at the same time more difficult to execute since they are highly vulnerable to collective action problems. Given these characteristics, Fraser (2003) suggests that practical policy proposals should fit somewhere along the continuum of these two identified poles.

Taking this on board, if our aim is to transform our economic and social practices to the extent that they are no longer recongisable under the label of 'capitalism', perhaps the conceptualisation of alternative measures of wellbeing is one such strategy. It surely represents a reorientation from income and GDP measurements towards concepts of welfare and wellbeing, which is one of the descriptions that Kallis (2011) uses to explain the concept of sustainable degrowth. A succesfull decoupling of wellbeing from a fixation on economic growth may be an important contribution to making degrowth a viable political strategy. As many authors have argued, it is important to realise that sustainable degrowth is not equivalent to negative GDP growth. That phenomenon already has a name, recession, and we have unfortunately grown to know it very well during the last years, together with its pallette of negative social outcomes such as unemployment, economic insecurity and social upheaval. In contrast, sustainable degrowth rests on the idea that we can downshift the economy through institutional changes, by collectively managing 'a prosperous way down' (Odum and Odum 2001) through a political process of choosing to have, for instance, fewer airplanes and cars but better social services, more public space and greater personal autonomy.

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Institutional Innovations for a New Economy

Understanding the confines of the prevailing socio-economic system, let alone institutional innovations that redress its main shortcomings, requires a system perspective that is not shared by all schools of economic thought. Furthermore, as definitions of "new economy" may differ we will use this phrase to denote an economy that maximizes societal wellbeing and not only that of certain societal groups. One of the possible approaches, renowned for its institutional and structural perspective as well as by its historicity, is offered by the French Regulation Theory that we will employ in this paper.

> For Boyer, the Régulation approach presents itself as a research programme of gathering together historical studies, international comparisons and macro-economic tests with the goal of identifying some typical configurations of modes of development and their crises. When these crisis tendencies are mitigated, *'régulation'* is said to occur. (James 2009: 185)

While a thorough description of The Régulation approach (RA) is beyond the scope of this paper here is only a brief outline. It conducts analysis on three different levels: 1. mode of production – such as feudalism or capitalism, 2. regime of accumulation – a socio-economic order that is in place between two structural crises and that spurs accumulation; and 3. institutional or structural forms (monetary regime, wage-labour nexus, forms of competition, forms of insertion into the international regime, forms of the state) (Boyer and Saillard 2002). Based on these foundations the researchers mostly studied Fordism, a period of some thirty years after the Second World War, but also post-Fordism, the current phase which succeeded the former. In the countries of the west Fordism was characterised by intensive accumulation (Brand and Wissen 2011), stable international monetary system and little exposure to international competition, stable work relationships and welfare states. Post Fordism has been marked by an extensive accumulation (ibid.), a demise of the stable Bretton Woods international monetary system, financialisation (as an increase in significance of the financial sector), technological changes as well as the diminution of the welfare state.

A gap between the Régulation approach and ecological considerations have partially been addressed by Lipietz (see Whiteside 1996) and more explicitly by Raza (1999), who calls for an introduction of the sixth structural form "nature-society relationship". In absence of the fully developed concept that would bridge this gap we can borrow the concept called socio-ecological regime which links socio-economic with biophysical characteristics of a societal system as well as the usage of energy and materials (Sieferle et al. 2006 as in Spash and Schandl 2009: 50) allowing us to observe an immense increase of energy and material use per capita and per area as well as CO_2 emissions per capita between the historical agrarian regime and the one that followed with the onset of the industrial revolution – the industrial regime (Krausmann et al. 2008 as in Spash and Schandl 2009: 53). The energy and material use has been in direct correlation with the economic growth, measured by the increase in gross domestic product (GDP). Hence although it is theoretically possible to imagine economic growth without overutilisation of natural resources historical evidence does not seem to support this.

Indeed, the connection between economic growth and overutilisation of natural resources cannot be broken up as easily, as Brand and Wissen (2011: 25) remind us (own translation):

> [T]he fossile production and consumption patterns… are anchored deeply in societal power relations, common sense and everyday practices of the peoples of the global North and increasingly also of the global South, just as they are anchored in overall orientation on economic growth and competitiveness.

When we add to it a problem of inequality that Domazet writes about in this Volume but also of persistently high (youth) unemployment rates that have been present in some western countries since the onset of the so called Great Recession from 2007/8 onwards, then we can easily come to the conclusion that the prevailing economic system has failed. However there are no value-free and ready made institutional innovations that would amend the system, but only options one may chose. Although not explicitly encompassing ecological system in its theoretical apparatus the Régulation approach's emphasis on historically stable socio-economic constellations lead us to the conclusion that many variations in socio-economic systems are possible. As Jessop (2013: 13) asserts:

> Whether or not the search for solutions to economic crisis restores the prevailing accumulation regime and its mode of regulation does not depend solely on the objective features of the crisis and the feasibility of resolving it within this framework. It also depends on the institutional, organisational and learning capacities of the social forces seeking to resolve the crisis and on the outcome of the contest to define the nature of the crisis, to explain its various objective causes, to attribute blame for its development, and to identify the most appropriate solutions.

Stockhammer (2013) finds that financialisation, shrinking of the welfare state as well as globalisation are the main causes behind falling wage share in the past quarter of a century, all of which contributed to rising inequalities. Indeed, the current socio-economic crisis itself is caused by financialisation and an intensifying inequality (Stockhammer 2012). Hence, Stockhammer (2012: 64) concludes one should:

> advocate definancialization. This would imply a shrinking of the financial sector, a stronger voice of stakeholders, such as labour unions, at the expense of shareholders in corporate governance; it would also aim at replacing the logic of profit (or shareholder value) maximization in many social areas by a democratically determined policy priorities and principles of solidarity.

While that is uncontroversial in terms of progressive economic policy that is democratic and socio-economically viable the following part of his conclusion is written from the perspective of economic growth and will therefore not find wide support among environmentally conscious social scientists (Stockhammer 2012: 64):"[H]igher wage growth is one condition for re-establishing a viable growth regime. Wages have to increase at least with productivity growth". Indeed, such reformist policy solution seeks to resolve stability in the economy by ensuring unabated economic growth through more just distribution of income in the economy (progressive taxation is an obvious choice here). But if we cannot manage to ensure decoupling of economic growth from overutilisation of Earth's resources and energy use then this policy alone cannot be a viable alternative in itself.

A radical solution is represented by the concept as well as the policy initiative of (sustainable) degrowth that is intended to reduce society's overall use of material and energy, since it is believed that this cannot happen with increasing GDP. However, this is not the same as striving for negative GDP growth rates (Kallis 2011: 874). Pursuing sustainable degrowth means finding institutional innovations on many different issues.

> [O]ne proposal is to introduce global caps on key resources such as oil and CO2 emissions that are shared equitably between nations on a per capita basis ("cap and share," Douthwaite 2011), and are declining over time. In addition, degrowth proponents put forward three more propositions in order to respond to the negative effects of economic contraction on employment and social stability: namely, work-sharing, strengthened social-security system, and alternative economic spaces existing outside the market economy (Latouche 2009). (...) Furthermore, the link between well-being and access to wage labor in the formal economy can be weakened by improved access to non-monetized goods and services. There are various social innovations in this domain, including urban food gardens for own consumption, time-banks where participants exchange services on the basis of their labor time, and co-housing projects where participants co-invest "sweat-equity" in house rehabilitation (Oarlsson 2008; NEF 2009). (van den Bergh and Kallis 2012: 912-913)

On the basis of the framework laid out above we may conclude that institutional innovations for a new economy should not be simple fixes of the current economic system, since they should change its very foundations. Rather then advocating a specific set of institutional innovations we have presented some policy options that should be further elaborated elsewhere, bearing in mind the socio-economic and ecological foundations of our societies.

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Sustainable Cities: We in Cities That Need to Change

For the first time in human history there are more people living in complex, dense, predominantly non-agricultural, human-built environments called cities than in rural areas. This milestone in the history of our species was reached in 2008 (UNFPA 2007). This is another piece of evidence to claims in Domazet's article about unprecedented impact of humans on planet Earth that lead some scientists to call this "geological" era "Anthropocene". Perhaps we are witnessing a new geological subdivision of Anthropocene era because Burdett and Rode (2010) announced that the "Urban age" has began, with three quarters of the world population expected to live in cities by 2050. This is the pinnacle of the increasing global urbanization process that started two centuries ago and is inextricably linked with processes of industrialisation, modernisation and development of capitalism. It is more and more clear that in order to address the global sustainability challenge of the current *civilisation* that Domazet addressed in the introductory article, sustainability or non-sustainability of *cities* as a dominant form of human habitation has to be addressed.

Before exploring whether cities are more a part of the problem or a part of the solution for global sustainability of the existing civilisation, the first question already tabled is whether this civilisation is worth saving or even what essential component could it most readily be reduced to? Is it the current global economic system that reproduces social and environmental injustice around the world? Is it the often imperialistic Western culture and science? Is it the international polity or community of national states unable to govern global and long-term threats to humanity and millions of other species? Encyclopaedia of Human Geography defines "civilisation" as "a process of intellectual, spiritual, and aesthetic development in which people leave a state of savagery and progress through a hierarchy from low cultures to high culture" (Warf 2006: 323). It goes on by saying how this idea is both criti-

cised as a linear evolutionary process that justifies domination of one group of people over the other but also as a negative process that distances people from nature, thus making the "lower cultures" ideal civilisations. This paper follows the position that global civilisation as the global society should indeed be *sustained* not because it is the best possible world which is worth saving *per se*, but because the opting for the unsustainable path of material consumption might eventually lead to the global society regressing to a less desirable state. On the other hand transforming social structures to overcome both material limitations and reproduction of social inequalities might allow global society to advance[8] towards universal human emancipation. This paper takes the position that the civilisation did advance despite all of its imperfections and that it could both regress or advance further. It also argues against regressing to "traditional", "primitive" societies or "lower cultures" as a path towards greater environmental sustainability. The latter is welcomed by those who believe that the pre-modern societies lived in harmony with nature, named "ecological noble savage" myth in the literature (Redford 1990). Etymologically, "civilisation" is closely related to "city" while Bagby defines "civilisation" as a "culture in which we can find cities" (1959: 162). These conceptual assumptions have to be resolved before answering whether cities are a problem or a solution for the environmental, social and economic sustainability of the global civilisation.

When one considers the environmental aspect of the urban sustainability challenge the environmentalist movement was from the outset sceptical of industrialisation and its by-product urbanisation, so there is an ongoing debate whether cities are a problem or a solution for the global environmental sustainability. At one side of the debate are the more modernist approaches like "smart cities" (Seisdedos 2012), which see cities as a solution for environmental sustainability and these are mostly based on eco-efficiency paradigm according to which high density of urban form allows for a more efficient transport, industrial production and other urban systems assisted by sophisticated technology and social intelligent design. Of course it is not the same when one talks of, for example, typical American city or a typical European city – an urban sprawl or a compact city. It is true that cities can significantly reduce human habitat footprint, illustrated in abstraction by imagining a single world city. Were we to put the current total world population into a single city that would have the population density of Paris, the surface of that city would be similar to the surface of Finland.[9] Unfortunately, habitat footprint of cities alone does not equal their overall ecological footprint, as materials and energy that are consumed by the cities require a much bigger land surface area than the area on which they are built. The assumption of eco-efficient cities does not only mean that cities are improving global sustainability, but that large cities can leverage more efficiency per capita so that they could contribute to the global sustainability more than smaller cities.

However, a recent study (Oliveira et al. 2014) has shown how large cities, despite economy of scale which increases efficiency, have proportionally bigger carbon footprints than small cities. How is it possible that larger cities despite of improved efficiency in transport and other systems still produce more CO_2 emissions per capita than smaller cities? They are simply more productive, eventually in the material sense, meaning that their citizens have bigger incomes per capita and consume more. This shows that addressing only the *efficiency* of cities without addressing the *sufficiency* or material and energy consumption by cities will

[8] Preferring the term "to advance" rather than "to progress" as the latter is loaded and conected with the modernisation theory and the Western concepts of progress as the linear deterministic development that backward societies have to pass.

[9] With the data at the time of writing the calculation goes as following: total world population (7.170.000.000 people) divided by population density of Paris (21.289 people/km2) the surface of the world city (336.793 km2) is similar to surface of Finland (337.030 km2).

eventually be *insufficien*t in terms of achieving urban sustainability. Cities are pursuing economic growth at all costs which is necessarily generating consumption growth so without some de-growth or anti-growth restructuring, efficiency and technological innovations will not be enough for achieving urban environmental sustainability.

At the other side of the debate are the more post-modernist environmentalist approaches to cities which see them as a problem for environmental sustainability because they inherently lead to consumerism, alienation from nature and social atomism. Instead of cities these environmentalists advocate ecovillages where only the "real" human material needs would be met with low technology through subsistence farming and crafts while sense of community would be re-invented (Kasper 2008). This approach is also shared by the movement of Transition Towns led by Rob Hopkins (2008) who established the first ecovillage in Ireland. The Transition Towns is movement aiming, mostly in small towns, to reduce carbon footprint, fossil fuel use and vulnerability to global financial flows through localisation of economy and building of community. These smaller and more traditional physical forms of human settlements would be without benefits of economy of scale and without sophisticated division of labour, hence *less efficient*, but would be more *(self-)sufficient* by satisfying only the basic material human needs. There is however a question of whether the world of soon to be 9 billion people can afford such de-industrialisation, de-modernisation and de-coordination if it wants to meet even the most basic needs of all these people.

The ecovillages and ecotowns approach is following a specific environmentalist framework called "small is beautiful" (Schumacher 1993), but sometimes small is not technologically optimal. For example, in the domain of: of energy conversion, which Domazet stresses as the key compoenent of developmentalist project in the introductory article, the case of energy efficiency of biomass power plants shows that bigger power plants can turn significantly higher percentage of the thermal energy from biomass into electricity than the smaller power plants (Austin 2008). If "we need to change" as Domazet claims then this paper argues that "we need to transform cities" by using a combination of these approaches i.e. by tackling both urban eco-efficiency and eco-sufficiency. Cities could be a part of the solution for global environmental sustainability, but only if the social structures and governance mechanisms of cities are changed to stop the growth of meaningless consumption, and simultaneously increase the efficiency resource use. The concept of commons might fill-in this gap as it could at the same time addresses the issue of sufficiency and the issue of efficiency by bringing the social organisation of eco-villages into urban physical form on a large scale. For example urban community gardens are more efficient in use of natural resources, as the community uses a single piece of land, rather than individuals in their private allotments; collective production and consumption builds social capital and sense of community; there is a fair access to the food produced,not only within one particular urban community but through trade and redistribution with other community gardens within one city.

The social aspect of the urbanisation is linked to debate on modernisation process which through technological and scientific advancements transforms rural, traditional society into urban, modern society. One part of the environmentalist and other social movements considers modernisation as a negative process because the traditionalist rural culture of community and cooperation is transformed into a modernist culture of individualism and competition. The other part considers modernisation as a positive social processes which will dismantle traditional communities and social relations based on kinship, as they were usually linked with oppressive social forms like patriarchy. It was already stressed in this paper that regression to traditional pre-modern society as archetypes of ecological sustainability will

not be argued for, for such regression could mean more oppression and less identity freedoms. How then can we reconcile individual freedoms and identities on the one hand and collective care and sense of community on the other? Iris Marion Young's (1990) answer to this lies again in a city, in an urban social life. Young finds city as a perfect model in which diversity meets community, where parochialism is disabled and where different identities can coexist by maintaining the social capital, solidarity and tolerance. Small communities are creating social moral pressure for an individual to fit-in, while large cities give on one hand anonymity as precondition for individual freedom while in the same time direct experience of belonging to a large community or communities.

The economic aspect of urbanisation and urban sustainability is inextricably linked to the development of capitalism. Domazet argues that a technological fix will not solve the environmental sustainability problem, but a "spatial fix" or global urbanisation did however solve the problem of sustainability of the capitalist form of developmentalist project (Harvey 2001). Its global urbanisation on one side creates spatial inequalities at the global level and economic, and therefore social and political, inequalities within cities (Smith 2010). Neoliberal urbanisation in advanced capitalism both produces social inequalities and consumes ever-growing quantities of space/resources in order to sustain the capitalist system. This makes the neoliberal urbanisation one of the main contributors to the combination referred to by Domazet that leads to a total collapse of the civilisation. Changing how cities are reproduced is therefore linked with changing urban economic systems i.e. social structures of production, distribution and consumption. If the free-market economy creates perverse distribution outcomes the question remains how then to ensure the efficient use of natural resources. The state mechanisms of economic governance have historically been proven as too slow and inefficient so commons governance and economic democratisation might be the right way. In order to ensure efficient governance of resources, social innovations should be followed by the technological innovations and here the same study (Oliveira et al. 2014) shows that large cities create more technological innovations measured as patents per capita compared to smaller cities, possibly because of high dynamics and exchange of large number of people and their ideas. Empirical data of Elinor Ostrom (1990) showed many examples of successful community governance of natural and other resources but these communities have never been bigger than several thousands of people. If a sustainable city will be a "common city", this would mean tens of thousands of commons-based governance systems making a highly complex overall governance structure so that these systems are able to mutually coordinate and negotiate. However, it seems that the climate crisis is on the way and systems theory indicates that *complex* adaptive systems *can adapt* to their *changing environment* in order to *sustain* themseleves.

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Toward a Critique of the Political Economy of Climate Change beyond the Nature/Culture Binary: An Anthropologist's Meditation

> The philosophers have only *interpreted* the world, in various ways. The point, however, is to *change* it. (Karl Marx, *Theses on Feuerbach*, 1998: 571)

> You want to save the elephants in Kenya's parks by having them graze separately from cows? Excellent, but how are you going to get an opinion from the Masai who have been cut off from the cows, and from the cows deprived of elephants who clear the brush for them, and also from the elephants deprived of the Masai and the cows? (Bruno Latour 2004: 170)

From a certain vantage, anthropology might appear to be a peculiar disciplinary platform from which to launch a critique of the global political economy of climate change. According to the familiar taxonomy of the social sciences, anthropology is typically cast as obdurately particularistic, concerned with idiographic description rather than nomothetic explanation (cf. Wallerstein et. al. 1996). My contention in this brief essay, however, is that anthropology has a crucial, indeed central role to play in interpreting the dilemmas of climate change and forging strategies by which to alleviate its depredations. Anthropology's potential contribution to addressing the challenge of climate change stems from the conceptual underpinnings of the discipline: more so than any other human science, anthropology has grappled fiercely and continuously with the problematic relationship between "nature" and "culture." In recent decades, anthropologists have rejected the earlier, essentialist distinction between "nature" and "culture" in favor of a more nuanced, practice-based holism, which views "nature" and "culture" as mutual concepts that necessarily mediate and condition each other. This revisionist perspective surely holds key lessons for the debate over climate change. Rather than viewing climate change as a series of "cultural" effects on "nature"—a perspective that problematically severs human action from "nature" itself—I argue for a new narrative of climate change, one that locates the political economy of neoliberal capitalism as its central object of critique. In doing so, I take up Mladen Domazet's clarion call to "bring to human understanding the processes unfolding on non-human scales … in emancipatory fashion in order to degrow but not destroy the civilizational accomplishments to date" (2014: 14).

Early 20th century anthropology, especially as practiced and propagated by Columbia University professor Franz Boas and his students in North America, staked its disciplinary legitimacy on the threshold between the domains of nature and culture (Boas 1989). For Boas and his disciples, culture, the locus of uniquely human traits and behavior, began precisely where nature ended—as the historian of anthropology George Stocking (1982) has demonstrated, Boas' incipient "cultural" anthropology was decisive in overcoming the evolutionary and racialist biases of 19th century anthropology. After Boas, biological anthropology—rooted in the study of human beings as natural organisms and still preoccupied with evolutionary concerns—and cultural anthropology—focused on human beings as, first and foremost, social and cultural actors—fundamentally parted ways. American anthropology throughout the mid-20th century remained rooted in the culture concept, as exemplified by the oeuvre of Clifford Geertz (1977); across the Atlantic, British ethnographers inspired by functionalist Durkheimian sociology drew an equally rigid distinction between nature and social structure (e.g. Radcliffe-Brown 1965).

Within anthropology, the rigid dualisms of nature/culture and nature/society only began to erode with the advent of structuralism and the Copernican Revolution in anthropological thought spurred by the work of Claude Levi-Strauss. Levi-Strauss famously inaugurated a critique of the distinction between scientific reason and other modes of human reasoning: "The scientist never carries on a dialogue with nature pure and simple but rather with a particular relationship between nature and culture definable in terms of his particular period and civilization and the material means at his disposal" (1966: 19). From the vantage of structuralism (and perforce post-structuralism), nature is no longer the absolute Other of culture; rather, the dichotomy of nature and culture is itself part of a broader, holistic process of meaning-making. From here, it is but a short distance to the arguments of Bruno Latour (1993), whose model of science and technology studies (STS) abandons not only the distinction between culture and nature, but those between humans and non-humans and subjects and objects as well.

A word of caution is in order here, as we have wandered onto potentially thin conceptual and political ice. I have adduced this brief, partial history of anthropological speculation on the nature/culture dichotomy in order to expose some of the treacherous pitfalls in theorizing climate change. In particular, two pitfalls, a Scylla and a Charybdis, threaten our analysis and our political ambition: on the one hand, an anachronistic, unrepentant essentialism that reifies both nature and culture, thereby establishing the unique privilege of scientific reason, and, on the other, a caricatured postmodern relativism that indiscriminately destabilizes the bases of *all* knowledge, scientific or otherwise, and thereby renders political action impossible. The first pitfall—simplistic essentialism—has deleterious consequences beyond the double reification of nature and culture. Most importantly in this context, the nature/culture binary polices the firewall between the "natural" and "social" sciences and renders the arguments of the each set of disciplines mute and impotent to the other. As Domazet cogently argues, such academic parochialism is detrimental to recognition "of our species' straddling of processes of vastly different scales ordinarily relegated to separate disciplines of discourse" (2014: 7). Only by overcoming the rigid separation between "natural" and "social" sciences can we hope "to find a voice that speaks from this straddling perspective" (ibid.). Such a "straddling perspective" is also crucial to avoiding the second pitfall, that of nihilistic relativism. The integrative, "straddling perspective" that Domazet advocates necessarily takes us beyond Latour's deconstruction of scientific knowledge, which has frequently been accused of aiding and abetting climate change skeptics and other politically reactionary actors (Sokal 1996; see also Demeritt 2006). In the remainder of this essay, I hope to contribute to just this sort of "straddling perspective" and the struggle against epistemological nihilism in relation to climate change by destabilizing the nature/culture binary with a third term (which, I should note, Domazet also interrogates): neoliberal capitalism.

Capitalism demands our critical scrutiny precisely because, as a political economy, it is blithely indifferent to the nature/culture dichotomy. As Marx and Engels' famous metaphor established long ago, within the regime of capitalist commodification "all that is solid melts into air" (1948: 16)—whether the solidities in question here are "natural" or "cultural" is inconsequential. Arturo Escobar, an anthropologist of political ecology, has reiterated the urgency of this fundamental Marxian point more recently: "No longer is nature defined and treated as an external, exploitable domain. Through a new process of capitalization … previously 'uncapitalized' aspects of society and nature become internal to capital" (1995: 199). In a curious sense, capitalism succeeds pragmatically where social science has failed theo-

retically: It resolves the nature/culture binary by voraciously absorbing and commodifying "nature" and "culture" both.

What are the political consequences of erecting a critique of climate change on an interrogation of neoliberal capitalism, rather than on the nature/culture split? Most immediately, this focus on capitalism recenters environmentalism and green activism as commitments to social justice, rather than "merely natural" engagements (cf. Butler 1997). In other words, the critique of climate change is as much about human subjects and the inegalitarian relationships that maintain among them as it is about the "natural" world. And the reverse is also true: social justice is not merely a matter of human inequalities. In the era of neoliberal capital, the commitment to social justice necessarily spans the problematic divide between natural and cultural, human and non-human worlds.

Even as we forward this reappraisal of the relationship between capitalism and climate change, however, we must also take care not to substitute one reification for another. Capitalism, especially in its neoliberal iteration, is no more of an essence than "nature" or "culture". Consequently, resistance to the effects of neoliberal capitalism—climatic or otherwise—must necessarily be decentered and multiform as well. As Michael Hardt and Antonio Negri (2001) remind us, the global "multitude" of the 21st century is not the proletariat of the 19th century. Of course, this is not to deny the urgent need for a global political reorientation, based firmly on "thinking for the 22nd century," in the struggle against climate change, as Domazet (this volume) so passionately argues. It is simply to acknowledge that this process of resistance and reorientation will not, and cannot, be identical in all of its specific contexts. Nor is this cause for pessimism. As the anthropologist and environmentalist Anna Tsing (2005) has persuasively argued, "friction" among contexts and levels of political activism is inevitable in the age of dense, multidimensional interconnection that we dub globalization. Rather than despair over this ineradicable friction, the global movement to combat climate change must recognize and draw strength from it.

By way of a conclusion, I want to return briefly to the two quotations with which I framed this essay, from Marx and Latour, respectively. Together, they function as coordinating signposts for my argument and aspiration. Following Marx—the paradigmatic activist intellectual—we must emphasize that scholarly speculation divorced from political action is little more than a cart without a horse. To *interpret* the world of climate change without *changing* it is to perpetuate the social and ecological injustices of this world. From Latour, on the other hand, we learn a cautionary lesson. Even as we struggle to link our interpretation of climate change to pragmatic political action, we must remain attentive to the frictions that our political project will inevitably provoke and involve. All vested commitments are not compatible; one cannot render the interests of the elephants, the cows, and the Masai entirely commensurate. The struggle against climate change can only achieve global traction by acknowledging and addressing these myriad frictions. And it is at this juncture that anthropology, with its continued focus on the particularities of contexts, can seize its role in combating climate change. While climate scientists and political economists are key to mapping the contours and predicting the consequences of climate change on a global level, anthropologists are ideally located to trace and rectify the frictions that the political project of reversing climate change will necessarily entail.

In this brief meditation, I have endeavored to make a small contribution to this project of overcoming friction by exploring the anthropological legacy of the nature/culture binary and its relationship to the climate change debate. Taking inspiration from Domazet's essay, I have argued that rejection of the essentialist nature/culture binary and a concomitant fo-

cus on issues of neoliberal capitalism and social justice is imperative to the advancement of the political struggle against climate change. My hope is that these interpretations provoked some friction in their own right—friction is, after all, a source of heat and energy, and a spur to action. And the prospect of this action—to *change* the world of climate change—is what unites our various interventions in this forum, and, hopefully, in fora yet to come.

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Climate Change, Social Injustice and the Pathology of Life in Post-industrial Capitalism

The tone of Domazet's (this volume) piece is appropriately one of urgency. "We live in extraordinary times", he writes, marked by capitalism's insatiable and detrimental urge for growth, related global environmental change and deepening social inequalities. He draws on expert sources warning us that hoping for a technological breakthrough that will solve the climate predicament is naïve, and instead urges us to embrace a sustainable degrowth project. My aim in this response to Domazet (this volume) is three-fold: to take a slightly closer look at an existing theme in his essay, the social injustice aspects of climate change, and to add to his piece by, on the one hand, furthering his critique of capitalism from the perspective of literature on the affective consequences of life in a consumer society and, on the other, by touching upon personal biases that favour the status quo in terms of environmental action. By doing so I wish to contribute to what I see as his critical project of evaluating "the established way of organizing society" against "other possible ways, ways which are held to offer better chances for alleviating man's struggle for existence" (Marcuse 1991 [1964]: 42) (though it would be appropriate to exchange Marcuse's phrase "man's struggle for existence" with "the planet's struggle for existence" in the climate change context).

Barker, Scrieciu and Taylor (2008), characterise climate change as "inherently inequitable and therefore unjust", because it targets "systematically and mercilessly the vulnerable, the poor and the extremely poor" (2008: 318). The social justice dimension of climate change is discussed in the literature as a supra-national and national, inter- and intra-generational issue. Preston et al. (2014) conclude in a recent study that theoretical literature on climate justice has tended to focus on the unequal distribution of responsibility for carbon emissions between nations, i.e. North/South or post-industrial/developing. Although the authors acknowledge the importance of drawing attention to this supra-national dimension of climate justice, they also spell out its national dimension: disadvantaged groups contribute least to causing climate change yet are likely to be most negatively impacted by it; they pay, as a proportion of their income, the most towards the implementation of certain policy responses yet benefit least from them; and they are less able to participate in decision-making around policy responses. According to Preston et al. (2014), disadvantaged groups include older people, people on low incomes and, overlapping with the low income group, tenants. Drawing on the example of floods, the authors point out that recovering after a flood can be more difficult for people in poverty due to insufficient insurance or no insurance, the cost of temporary housing, transport costs related to relocation and lower access to credit. They call for national policy related to climate change to take more account of social inequalities,

expressing concern over the consequences of, for example, a risk-based market approach to flood insurance (insurance premiums proportionate to the individual household's level of risk) as opposed to an approach grounded in solidarity (those of lower risk support those at higher risk). Recent severe flooding in Bosnia and Herzegovina, Croatia and Serbia (May 2014) brings the importance of such thinking close to home.

An important, related issue is the interrelationship between economic growth, the environment and social justice. As Muraca (2012) points out, there is a split between those who see economic growth as a condition for distributive justice and defend its impact on the environment and those who see it as a threat to justice and the environment. For the former, economic growth increases the total amount of goods to be distributed which enhances overall standard of living, fosters social mobility, and boosts government revenues for social services thus improving the social welfare system. According to this argument, continuous growth is necessary for employment and spurs investment into technologies for coping with environmental problems. Domazet (this volume) labels this as "the imperative of growth *cloaked* as promise of emancipation" and refers to capitalism's growth imperative as a "harmful mechanism which feeds off increasing inequalities".

Muraca's (2012) degrowth critique against pro-growth claims is persuasive: the "trickle-down effect" does not hold – without redistribution growth leads to an increasing gap between rich and poor, and there is a tight correlation between GDP growth and the destruction of the natural environment, including the increasing need for new resources leading to geopolitical forms of domination, such as production of biomass for the Global North or neo-colonialist water pollution and land grabs. Muraca (2012) goes on to question the growth imperative not only from the perspective of distributive justice and the environment but also in relation to our affective selves. As she points out, there is a negative correlation between GDP per capita and subjectively perceived happiness.

The affective dimensions of life in capitalism have been addressed by many authors. What they have in common is a diagnosis of late capitalism and consumer culture as detrimental to wellbeing. We are harming the planet with consumption that harms us above and beyond Martinez-Alier's social justice argument that excessive consumption by the rich and middle-class people is "not only a menace for other species and for future generations of humans … it deprives poor people a fair share of resources and environmental space now" (2012: 62). Fromm (1956) uses the concept of "alienation" to describe the social character of Western "modern personality", people estranged from themselves who acquire just to have, satisfied with useless possession. Salecl writes about late capitalist ideology as increasing people's anxiety with its insistence on self-making and self-fulfilment, concluding that "it looks as if free consumers end up consuming themselves" (2008: 2340). And according to Ilouz, consumption is based "almost exclusively on the ideology of personal well-being and self-satisfaction … the market encourages consumer choices based on the cultivation of a hyper-individualist identity" (2009: 386). In other words, a sense of self-worth in capitalism is cultivated on individualistic terms rather than through notions of solidarity, empathy and recognition of interdependence that for Preston et al. "sit at the heart of cosmopolitan notions of climate justice" (2014: 21).

Domazet (this volume) seems to hope for a rational response to climate change: he urges us to "make a deep-rooted switch to sustainability using our collective knowledge" and maintains that a "reliance on the extensive knowledge of natural and social historical processes can help make the formerly localised alternatives benefit the global population". Salecl, however, focuses on emotional responses to alarming ecological problems: "we are behaving as

if nothing really has to change" (2012: 2280). Writing from a social psychology perspective, authors such as Johnson and Levin warn us that we are shaped by various biases which work against rational responses to climate change. Sensory biases direct us to avoiding reactions related to threats outside our direct realm of experience: "The machinery of the brain does not fully react to something until we detect it in the flesh" (Johnson and Levin 2009: 1595). Psychological biases include positive illusion (overconfidence about vulnerability to risk), cognitive dissonance (conflicting information made to fit preferred beliefs), fundamental attribution error (attributing one's own behaviour to situational constraints), prospect theory ("gambling on doing nothing in the hope that things will not be as bad as all that") and in-group/out-group bias (blaming the causes and consequences of climate change on others) (ibid.: 1598). As the authors note, all of these biases lead people to downplay the danger of environmental change and their contribution to it. Apart from these individual-level biases, Johnson and Levin (2009) also identify organizational and political biases as thwarting environmental action. They describe organisations as bureaucratically inert, marked by vested interests, turf wars over budgets and competition for promotions which all lead to a focus on the past and present rather than the environment's future. In terms of political bias, the authors write: "As long as the threat is at least four years away, or can be blamed on extraneous causes or opposing political parties, other concerns are likely to take precedence" (ibid.: 1599). For Johnson and Levin, policy makers and environmentalists should look beyond the facts and figures of climate change and take note of our responses to these, somewhat pessimistically concluding that "radical change may only come after people are woken up to the danger by enough – or big enough – disasters close to home" (ibid.: 1601). This is, however, (mostly) looking at responses to climate change at the level of individuals, which is an insufficient explanation for why we are not witnessing more action against climate change. On a more macro level, Krugman (2014), for example, writes that it is difficult to act against climate change in a political-economic context which is against government intervention ("think about global warming from the point of view of someone who grew up taking Ayn Rand seriously, believing that the untrammelled pursuit of self-interest is always good and that the government is always the problem, never the solution"), and which is hostile to science.

This response emphasises the following points: climate change is an issue of social justice; the false needs created by our consumer society, as well as capitalism's twisted agenda for us to consume more and compete more contribute to the planet's deterioration; and biases, vested interests, ideology and anti-intellectualism work against action on climate change. I would like to second Domazet's (this volume) call for a sustainable degrowth project along the lines of Boillat, Gerber and Funes-Monzote (2012: 600): "an equitable and democratic transition to a smaller economy with less production and consumption. It is about reducing the energy and material flows while still fulfilling basic and growing human needs such as food, health, education and housing". We are, after all, already witnessing "disasters close to home".

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New Planetary Vulgate: The Case of Environmental Crisis

In recent years or perhaps decades the theme of *excessiveness* has become a hobbyhorse for political groups and civil society activists situated on different parts of the left-liberal spectrum. Excessive exploitation of natural resources, excessive consumerism, excessive managers' bonuses, excessive inequality and other forms of socially indecent behaviour have often caused uproar in public debates, and yet there has been relatively little effort to investigate whether this excessiveness represents an aberration in the workings of contemporary capitalism or its constitutive feature. In this short response to Domazet's (this volume) paper that seeks to set the groundwork for "the holistic understanding of the economic hopes and geophysical drivers behind the themes of green economy and de-growth", I will focus only on points I find somewhat contestable or in need of a different articulation, leaving aside a vast area of common agreement.

There is, of course, nothing wrong in pointing out the excessiveness of capitalism, although it is important to do it in a comprehensible and a historically informed manner. The notion of "civilisation that humans have been developing for millennia" (Domazet, this volume), although it undoubtedly provides philosophical depth to the issue of limits to economic growth, doesn't do much to clarify the nature of the terrain on which the struggle over environmental issues is taking place. What kind of terrain is it? It is a contested terrain, marked by the continuous effort of the neoliberal forces to transform their market agenda into common sense and secure the implementation of market solutions to the environmental problems. That means that the odds are stacked against well-intended but naïve attempts to construct a politically undefined global subject that will act in interest of humanity as a whole.

There are several reasons why this is so. On the ideological level, neoliberals and supporters of the market solutions in general do not care about inequality. For them, inequality is, to paraphrase Gordon Gekko,[10] good. Inequality works. Inequality clarifies, cuts through, and captures the essence of the evolutionary spirit. The same justification could be given for the other forms of economic and political excessiveness, excluding, of course, excessive government deficits which must be reduced by any means necessary. Furthermore, neoliberal academics, public commentators and think-tanks are not afraid to simultaneously rely on scientific discourse and anti-intellectualism to support denialism about climate change and generate noise about the steps that need to be taken in order to avert the most devastating effects of environmental crisis. Domazet rightly points out that economic democracy, changes in social distribution of incomes, and "a culture coupling civilizational attainment with consumption behaviour" (this volume) are the necessary ingredients of sustainable development for the 21st century. However, these elements taken together are more or less irreconcilable with the entrepreneurial culture and the institutional setting developing both on the global and local level. It is enough to recall that the last ten years were literally wasted on the count of ludicrous attempts to implement various carbon trading schemes, such as the EU ETS, that failed to reduce GHG emissions and have in fact acted as a subsidy vehicle for the polluters generating windfall profits for the power companies across the EU (Hoffman 2011). The same entrepreneurial mystique can be observed in the European semi-periphery

[10] A character in Oliver Stone's 1987 film *Wall Street.*

where common entrepreneurial activity is being elevated to the status of indispensable social hermeneutics, so much so that any public specification of capitalist developmentalism as the driving force of the present environmental collapse is considered to be risky and ill-advised. The critique of capitalist developmentalism is acceptable in specialized journals, while the agenda in the real world appears to revolve around finding a way to incentivize the so-called business community not to participate in further destruction of our eco-system.

It is not important, at this point, whether business community's material interests are driving the dominant ideological framework or *vice versa*. By the time "new organization of knowledge able to interpret the complexity of different scale of collapse drivers" (Domazet, this volume) is translated to fit the new planetary vulgate (Bourdieu and Wacquant 2001), rallying call to intellectual mobilisation becomes no more than a careless whisper. This new vocabulary of employers, high-ranking civil servants, NGO-officials filled with buzzwords such as flexibility, governance, employability, fragmentation, exclusion, new economy, green growth is the main tool as Bourdieu and Wacquant point out, of the two social actors which play a prominent role in market "mitigation" of the environmental crisis:

> One is the expert who, in the shadowy corridors of ministries or company headquarters, or in isolation of think-tanks, prepares highly technical documents, preferably couched in economic or mathematical language, used to justify policy choices made on decidedly non-technical grounds…the other is *communication consultant to the prince* – a defector from the academic world entered in the service of the dominant, whose mission is to give an academic veneer to the political projects of the new state and business nobility. (Bourdieu and Wacquant 2001: 5)

These groups are in the business of knowledge production, but are generally not curious enough to examine how "both the individual experience and the grand historical narratives weave an important meaningful whole" which can help us to "understand something about our common future" (Domazet, this volume). They are, however, interested in depicting capitalism as a complex evolutionary system which works best if left alone. Moreover, they are particularly well trained in giving reasons why democracy is dangerous if it implies giving decision making capabilities to the *ignorant masses*. Thus, one should pay attention to the content and manner in which the collision of market and nature in the new planetary vulgate proscribes democracy and collective action in dealing with social and economic aspects of the environmental crisis.

If "a global subject (we) has to be defined" as Domazet suggests, it will have to be a "we" which has not grown tired of honouring the political commitments of the left, nor is afraid to ask the difficult questions, such as those Wendy Brown (1999) posed in her critique of the left melancholy:

> What political hope can we nurture that does not falsely ground itself in the notion that "history is on our side" or that there is some inevitability of popular attachment to whatever values we might develop as those of a new left vision? What kind of political and economic order can we imagine that is neither state-run nor utopian, neither repressive nor libertarian, neither economically impoverished nor culturally gray? (Brown 1999: 27)

It is questions like these that have to be taken on board if one wants to do more than simply address the apparent excessiveness of the capitalist production. In confronting the powers that be, the identification of weak or contradictory points in the neoliberal agenda should go hand in hand with the development of emancipatory counter-narrative which will allow the left to circumvent the pitfalls generated by the academic community and the neoliberal think-tanks.

REPLY TO COMMENTS

Mladen Domazet

I am grateful to Danijela Dolenec, Vladimir Cvijanović, Tomislav Tomašević, Jeremy Walton, Karin Doolan and Mislav Žitko for their critical responses to the opening proposition and for a continuing debate that has always been at the heart of sustainability thinking as embodied within Group 22. The debate is rooted in background reflexion of the transformative work each of them undertakes in our community, and is exemplary of the evolving sustainability thinking as interpreted and reinvented in the peripheral societies of Europe. That is the first thing that makes the discussion performed here for the sake of this journal's addressees more than just letters arranged into academic reflection of life; constituted as it might be of energy conversions, social structures utilising them and governance mechanisms supervising them. The other supra-textual spectre of this discussion is the illustration it provides of the different discourses, narratives, perspectives and, most importantly, wholesome worldviews as to what reflexive humanity ought to learn from its history and present position. This includes a permanent reminder to keep questioning its interpretation of reality at the same time as utilising it to modify that reality. It is this latter spectre of the discussion recorded here that I feel most drawn to reflect on in response.

I do not see the responses and comments above as disputes to be settled by the last woman/man standing, and could outright agree with expanding the opening piece with their additions; which I take many of these texts' opening paragraphs themselves attest. They do, nonetheless, present corrections, additions, calls for clarifications, proposals of consequential strategies to be further examined or calls for redefinition of the conceptual tools applied to the problem. Some combine several of those aspects. Calls for the redefinition of conceptual tools comprise perhaps the most substantial challenge to the proposals contained in my original article and illustrate the most important divide between the researchers-activists within the programme enacted in Group 22, and perhaps the green left in general. It is also the greatest intellectual challenge to a philosopher, one unaccustomed to find application of his/her intellectual endeavour. Despite calling for historical urgency, I am therefore tempted to heed Walton's invocation to '[intellectual] friction' as prospect for action and continued debate, but the comments on comments offered here will have to remain sketchy, indications of thinking yet to come.

But first for some history, again. Invocation of (historically or geophysically) imminent collapse of civilisation undoubtedly has a Malthusian ring to it. The historical Malthus is a much maligned figure revered as a prophet and berated as a developmental spoil-sport, 'the apostle of the rich' (Shelley) and the sinner 'against science' (Marx) (cf. Shapin 2014). Whichever view you want to take on a historical figure (and take your pick of academic commentary every time a development crisis becomes apparent enough), Malthus' legacy is a useful illustration of the vagaries of our discussion in the preceding pieces. Some of the scientific warnings of potential civilizational collapse have an explicit Malthusian underpinning, for example Ehrlich was predicting a Malthusian sustenance collapse in 1970s, and the debates over whether scarcity is an indication of the final exhaustion of margins or a spur to

miraculous reinvention of humanity (or just capitalism, cf. Tomašević, Doolan and Žitko's contributions, this volume) continue into 21st century (Mayhew 2014). But a different perspective on the historical legacy of Malthus is important here, one of choice of methodology for analysis of the developmentalist project we call civilisation.

Malthus' own description of the humanity-nature interaction is an example of a mechanistic science, a constructive explanation[11] of the processes of 'social metabolism', which in his view consists of elemental concepts of food, organisms and the fundamental laws governing their temporal evolution, organisms need food to survive and strive to reproduce. In his view food is a limited resource and the reproduction drive is inherently insatiable leading to a geometric progression in the size of the population and eventual scarcity of food. Whether the ontology thus posited is correct or not is not of interest here, but the method for anticipation and possible rational influence on the future is. Given the mechanism, our actions concerning the future consist of unfolding the reel of mechanism's operation and tinkering with its components to alter its final states. When strategizing an action we conceptually begin with the certain hypothetical elements, the elementary entities in terms of which to construct mental models of the complex phenomena we expect to observe or avoid. My own analysis of the developmentalist project in terms of mechanisms of energy conversions, social structures that utilise them and the governance mechanisms that supervise them (in the opening piece) could be taken as following that approach. In that I am revealed as an incorrigible physicist following Einstein's dictum that understanding a process ultimately means finding a constructive theory[12] that covers the process in question (Einstein 1954).

I understand Dolenec, Cvijanović and Tomaševeić's comments, among other insightful concepts, theories and strategies they bring to the table, to be working with a similar worldview. They take the proposed or a similar mechanism and ask which of its components can be most effectively impacted on to modify/avoid the complex's future collapse state. In that they are an example of a part of critical thought on the left, and vociferous within Group 22 research and thinking, not quibbling with what the nature of a hammer or a sickle ought to be, but what can be *done* with each of them now, given "the urgency of the task at hand" (Dolenec, this volume). Dolenec explicitly advocates "making small practical proposals" whilst keeping an eye on the "Gargantuan task" ahead. In recognising capitalism's inherent connection to growth and its inherent connection to inequality, whose own inherent connection to unsustainability of the current development model and eventual collapse should be decoupled, she proposes a degrowth strategy whose first step is a re-evaluation of what we actually measure as progress and civilisation. It is a way to achieve eventual energy conversion changes required to alleviate catastrophic climate change through tinkering with social structure and governance mechanisms in terms most readily understandable to everyone: wellbeing and welfare.

Vladimir Cvijanović, in a succinct presentation of one transformative (and potentially trans-disciplinary) school of economic thinking, takes the call for degrowth one step further, explaining how its implementation requires more than simply reversing the harmful GDP growth at any cost. There are echoes and parallels of his recognition of urgency to orientate the Régulation Approache's detailed explanation of workings of the historically stable socio-economic constellations on the woes of 21st century in Žitko's calls to name the political orchestrators of the status quo and Walton's requirements of the study of social dynamics to speed up the resultant explanatory model's application. Yet, and I can only humbly agree,

[11] I have dealt with constructive and principle explanations in natural science, a popular paradigm of *method*, at length in Domazet 2012.
[12] Constructive, as opposed to a simpler and at times revolutionary principle theory (method) to be introduced below.

Cvijanović states that "institutional innovations for a new economy should not be simple fixes of the current economic system", requiring an eventual substantive change in social structures and governance mechanisms adjacent to current energy conversion technology. Recognition of mechanism, operating on its components, but an aim for a fundamental overhaul in the end.

What might the substantive changes be like on the ground is well elaborated in Tomašević's piece presenting a reification of all three of civilisation's essential elements in the modern city and the historic role of contemporary cities with regards culture and resource consumption. Technical notions of resource efficiency and economies of scale are here well illustrated in the complex phenomenon arising out human populations, individuals' aspirations and structures of social reproduction. I could not have foreseen a better instantiation of the adoption of the standpoint of a future collapse and subsequent entertaining of the (supposedly) past counterfactual possibilities, which I characterised the "thinking for the 22nd century" by in the opening piece. And yet, like my own proposition, these could all be seen as resting on constructive metaphysics of future change. In that they could methodologically be likened to the view of ecological economics, with its energy-value materialist ontology and 'nature' as the ontological basis of value defined as 'enjoyment of life' (Burkett 2006); and Malthus' essentialism of humanity-nature interaction through deterministic evolution. How right or wrong this might be is not the issue here. What is interesting is the vociferous critique they both attract from the Marxist analysis of the structures of capitalist ascription of value, as a ground for a different response to entertaining the past counterfactual possibilities from the standpoint of 22nd century.

If you are still reading, this is where our historical example comes to fruition. Malthus' mechanistic evolution of increasing population into a situation 'when the number of men surpass their means of subsistence' (cf. Shapin 2014) drew staunch opposition from the Marxist thinkers as both scientifically wrong and unduly pessimistic of the human transformative potential. Likewise, ecological economics, in Burkett's analysis, is criticised from a Marxist (thus essentially radically critical of capitalism) perspective for giving undue ontological weight to capitalist forms of valuation (Burkett 2006). It is not the intentions of ecological economics, but its very explanatory ontology that is problematic from the perspective of Marxist left.[13] Perhaps what we need, they might say, is a whole other explanatory approach, one based not on hypothesising what the mechanism behind nature-civilisation complex is, but on simple principles which provide unexceptionable generalizations of the desirable future outcomes. Not a game of counterfactual *what-might-have-been*, but a listing of the necessary conditions or constraints on events that describe simply and self-evidently what the world must be like for the unwanted outcomes not to take place. Not the constructive ontology of how collapse could be avoided, but an explanatory generalisation of the principles that constrain and define the desired, non-collapse and civilisation-sustaining world. This is a fiery 'friction' that has the potential to give rise to the "voice that speaks from [a disciplinarily] straddling perspective" (cf. Domazet, above).

Whilst acknowledging that a Malthusian pessimism has hardly been historically positively falsified, i.e. that it still provides a viable method and ontological framework today (barring class and 'racial' insensitivities), I take the liberty to read the remaining three responses in the line of criticism of such an explanatory and predictive method. In that they make a strong point, connect to a powerful historical precedent and provide a good illustration for the read-

[13] The same can't be said of the Marxist criticism of Malthus, who was derided as the unapologetic reactionary speaking for "the exclusive interests of the existing ruling classes or sections of them" (Karl Marx, T*heories of Surplus Value*, 2: 136-137).

er of the depth of the debate along the green-left political spectrum. Jeremy Walton warns of the dangers of "viewing climate change as a series of 'cultural' effects on 'nature'", redolent of the ontological separation of energy conversion technologies (which includes utilisation of living organisms) and social structures for its utilisation. He is nonetheless aware of the dangers of impotent yo-yoing between "simplistic [ontological] essentialism" and its utter methodological negation, "a caricatured postmodern relativism" (Walton, this volume). I therefore take his call for focusing our critical scrutiny on "an interrogation of neoliberal capitalism" as an example of a paradigm methodological shift from entities to principles, a "decentred and multiform (…) resistance to the effects of neoliberal capitalism" as a framework for global political reorientation in the 21st century, instead of seeking the modifications to some intellectually posited historical mechanism.

Likewise, Karin Doolan's invitation to complement the rational analysis of the climate change threat with "emotional responses to alarming ecological problems" (Doolan, this volume) could also be taken as an invitation to understand the change required in 21st century as paradigmatic demarcation of the space of action by the innately human affective responses to the "disasters close to home" (ibid.). Doolan calls for a recognition of the political-economic context and cultural hostility to science not as an object of academic research, but a direct obstacle to action against climate change, and its attendant civilizational collapse. We know the kind of transition we require, the intellectual analysis should give us the tools to achieve it, not furnish a finer level of descriptive detail. The most vociferous agreement with the analysis of ills, but from wholeheartedly different paradigm, is exemplified by Mislav Žitko's scathing criticism of a historically misinformed enumeration of the "excessiveness of capitalism" and invocation of a wholly different "terrain on which the struggle over environmental issues is taking place". If one wants to understand the change that the 21st century calls for in the opening piece, then one must see it as a struggle against "neoliberal forces" and not an intellectual search for a "politically undefined" disinterested development mechanism, he says (Žitko, this volume). Name the opponent to be overcome ("the powers that be"), name the "political and economic order" you want to see in 22nd century (Žitko, this volume), and start putting it in place as soon as possible. With that, his comment concludes the snapshot of discussion and the recorded discursive edifice of an ongoing debate for a red and green political economy under the pressure of wholescale, material and measurable collapse of civilisation.

With deep gratitude to all commentators and apologies for inadvertently erroneous framing of their positions within a sea of worthy analyses and strategies addressing 21st century limits to growth, I want to stress that differences in explanatory paradigms are neither paralysing nor futile in science and explanation in general. As a historical example of Malthusianism shows, absolute collapse of British population has not occurred in 1825, nor of global population in 2000; but Malthusian growth concerns are every bit as vivid in the climate threat and mathematical carrying capacity modelling today, and the developmentalist project has engendered numerous instances of mini-collapses, painful denial of scarce resources to some and bountiful smuggling of externalities wherever possible. A philosophical rejoinder from an explanatory ontology straddling processes of vastly different scales might stress that the fundamental unit of a realist ontology is not the instantaneous state of a hypothetical structure, but a generalised thing. Things, as something we recognise as invariant through change, are ineliminable fundamentals of experience, and our understanding of the transformations to sustainability could be built on what we must *maintain* to make sense of the civilised, yet living, humanity as a common denominator of different political strategies.

In short, studying what we mean by progress, civilisation, reproduction and capitalism is neither an academic exercise in 'left melancholy' nor political lip-service to entrenched power-structures (Žitko, this volume). It is a necessary civilizational, cultural precondition of

cooperative meaningful action, a score that is as important for a melody as a taught string and a clean horn. It is the explanation that makes sense of the adventures to come, pace Gryphons admonitions to Alice to drop explanations for want of time and only provide a description of a sequence of events (Lewis Carroll, *Alice's Adventures in Wonderland*). Gryphon, after all, is hasty, dismissive and overbearing character who doesn't end well. Despite the, here largely unassailed, affective urgency of the present human geophysical and historical position, agreement on the common denominator for the political struggle "to *change* the world of climate change" (Walton, this volume) is the first step in choice of rational and irrational strategies to tackle it (both invariable traits of a humanity, de Sousa 2004). Read, decide for yourself, organise, cooperate, join us.

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